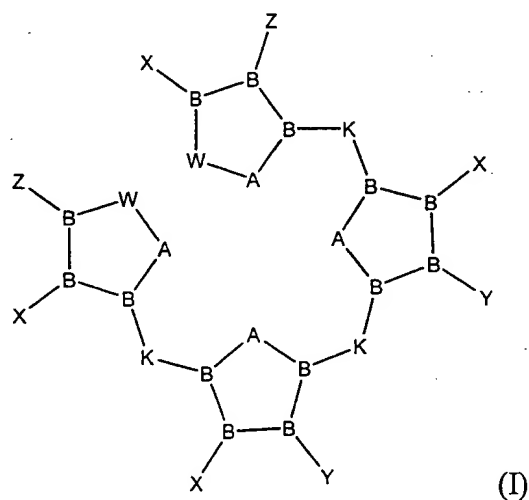


We claim:

1. A method for modulating cell proliferation or cell differentiation, comprising treating a cell with a bilin.
2. A method for regulating cell proliferation, comprising treating a cell with a bilin represented by the general formula (I):



wherein W represents  $-\text{CL}_2-$ ,  $-\text{C}(=\text{O})-$ ,  $-\text{C}(=\text{S})-$ ,  $-\text{C}(=\text{NH})-$ , or  $=\text{CL}-$ ;

X represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

Y represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

Z represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

A represents  $-\text{NH}-$  or  $-\text{N}=-$ ;

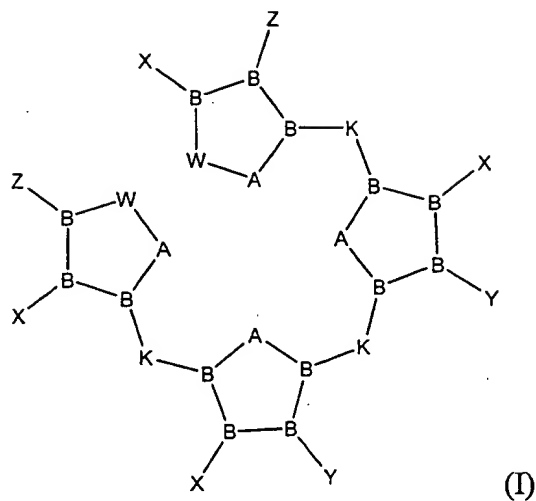
B represents a trisubstituted,  $\text{sp}^2$ -hybridized carbon atom;

K represents  $=\text{CL}-$  or  $-\text{CL}_2-$ ; and

L represents H or lower alkyl.

3. The method of claim 2, wherein the bilin regulates cell proliferation with an  $\text{ED}_{50}$  of 1 mM or less.

4. The method of claim 2, wherein the bilin regulates cell proliferation with an  $ED_{50}$  of 1  $\mu M$  or less.
5. The method of claim 2, wherein the bilin regulates cell proliferation with an  $ED_{50}$  of 1 nM or less.
6. The method of claim 2, wherein the cell is contacted with the bilin *in vitro*.
7. The method of claim 2, wherein the cell is contacted with the bilin *in vivo*.
8. The method of claim 7, wherein the bilin is administered as part of a therapeutic or cosmetic application.
9. The method of claim 8, wherein the therapeutic or cosmetic application is selected from the group consisting of regulation of neural tissues, bone and cartilage formation and repair, regulation of spermatogenesis, regulation of smooth muscle, regulation of lung, liver and other organs arising from the primitive gut, regulation of hematopoietic function, regulation of skin and hair growth, etc.
10. A method for regulating differentiation of a cell, comprising treating a cell with a bilin represented by the general formula (I):



wherein W represents  $-\text{CL}_2-$ ,  $-\text{C}(=\text{O})-$ ,  $-\text{C}(=\text{S})-$ ,  $-\text{C}(=\text{NH})-$ , or  $=\text{CL}-$ ;

X represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

Y represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

Z represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

A represents  $-\text{NH}-$  or  $-\text{N}=-$ ;

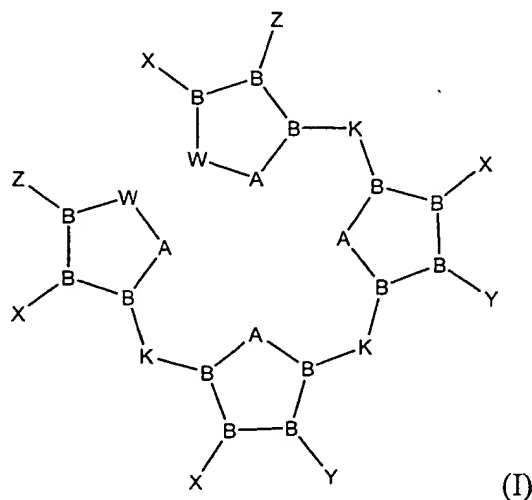
B represents a trisubstituted,  $\text{sp}^2$ -hybridized carbon atom;

K represents  $=\text{CL}-$  or  $-\text{CL}_2-$ ; and

L represents H or lower alkyl.

11. The method of claim 10, wherein the bilin promotes cell differentiation with an  $\text{ED}_{50}$  of 1 mM or less.
12. The method of claim 10, wherein the bilin promotes cell differentiation with an  $\text{ED}_{50}$  of 1  $\mu\text{M}$  or less.
13. The method of claim 10, wherein the bilin promotes cell differentiation with an  $\text{ED}_{50}$  of 1 nM or less.

14. The method of claim 10, wherein the cell is contacted with the bilin *in vitro*.
15. The method of claim 10, wherein the cell is contacted with the bilin *in vivo*.
16. The method of claim 15, wherein the bilin is administered as part of a therapeutic or cosmetic application.
17. The method of claim 16, wherein the therapeutic or cosmetic application is selected from the group consisting of regulation of neural tissues, bone and cartilage formation and repair, regulation of spermatogenesis, regulation of smooth muscle, regulation of lung, liver and other organs arising from the primitive gut, regulation of hematopoietic function, regulation of skin and hair growth, etc.
18. A pharmaceutical preparation comprising a sterile pharmaceutical excipient and a bilin.
19. A pharmaceutical preparation comprising a sterile pharmaceutical excipient and a bilin represented by the general formula (I):



wherein W represents -CL<sub>2</sub>-, -C(=O)-, -C(=S)-, -C(=NH)-, or =CL-;

X represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

Y represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

Z represents a substituted or unsubstituted alkyl, alkenyl, or alkynyl group;

A represents -NH- or -N=;

B represents a trisubstituted, sp<sup>2</sup>-hybridized carbon atom;

K represents =CL- or -CL<sub>2</sub>-; and

L represents H or lower alkyl.

20. A method for treating unwanted cell proliferation, comprising administering to a patient the pharmaceutical preparation of claim 18 or 19.
21. The method of claim 1, wherein the bilin is bilirubin or biliverdine.
22. The method of claim 2, wherein the bilin is bilirubin or biliverdine.
23. The method of claim 10, wherein the bilin is bilirubin or biliverdine.
24. The preparation of claim 18 or 19, wherein the bilin is bilirubin or biliverdine.